

REMARKS

Reconsideration of the present application is respectfully requested. Claim 24 has been amended. No claims have been canceled or added. No new matter has been added.

Claim Rejections

Independent claims 1, 8, 13, 19, 24, 30, 32 and 34 stand rejected under 35 U.S.C. § 103(a) based on Dekoning (U.S. Patent No. 6,691,245) in view of Strange et al. (US 2003/0084242). Applicant respectfully traverses the rejections.

One of the basic requirements of a *prima facie* case of obviousness is that the prior art reference (or references when combined) must teach or suggest all of the claim limitations. MPEP §2143.

Claim 1 recites:

1. A method for mirroring data on a first storage server and a second storage server, the method comprising:
queuing write commands at the first storage server between consistency points, the write commands being to write data corresponding to a file system of the first storage server to a local mass storage device coupled to the first storage server; at a start of each consistency point, sending the write commands to the local mass storage device and to a remote mass storage device coupled to the second storage server;
updating memory blocks of the local and remote mass storage devices based on the write commands; and
at an end of each consistency point constructing a representation to reference each memory block of the local mass storage device that is in use to represent the file system; and sending at least a portion of the representation to the second storage server.
(Emphasis added).

In contrast, Dekoning does not teach or suggest the above emphasized limitations. Regarding the limitation of queuing write commands at the first storage server between consistency points, the write commands being to write data corresponding to a file system of the first storage server to a

local mass storage device coupled to the first storage server, the Examiner contends that “Dekoning’s column 7 line 60 to column 8 line 11 suggests all subsequent new writes will be queued up and forward to the remote storage device for mirrored storage updating at synchronization time” (office action mailed on 6/9/2006, pages 2-3). Applicants studied the Examiner’s cited section, but found no discussion regarding queuing write commands between consistency points. Rather, the Examiner cited section discloses that synchronization updates may occur upon each “write” procedure to the local storage device or may occur at predetermined periodic intervals. Nothing in the cited section or elsewhere in Dekoning teaches or suggests that all write commands between consistency points are queued.

Regarding the limitation of at a start of each consistency point, sending the write commands to the local mass storage device and to a remote mass storage device coupled to the second storage server, the Examiner contends that Dekoning’s column 7 line 7 to column 8 line 18 suggests “write procedures to local storages devices led to synchronization of the remote storage devices, [and] new written data are forwarded to remote storage device” (office action mailed on 6/9/2006, page 3). However, as disclosed in the Examiner cited section and as the Examiner acknowledged in his argument, it is the new written data (emphasized in the Examiner’s argument), not the queued write commands that are sent to the remote mass storage device coupled to the second storage server. Thus, Dekoning does not teach or suggest the limitation of sending queued write commands to the remote mass storage device coupled to the second storage server.

Strange does not teach or suggest the above discussed limitations of claim 1, nor does the Examiner contend so. Therefore, at least for the foregoing reasons, claim 1 is not rendered

obvious as a *prima facie case* based on Dekoning in view of Strange. Thus, claim 1 and all claims which depend on it are patentable over Dekoning and Strange.

Independent claims 8, 19, 24 and 30 each recite similar limitations to those discussed above for claim 1. For similar reasons, claims 8, 19, 24, 30 and the claims which depend on them are also patentable over Dekoning and Strange.

Claim 13 recites the limitation of receiving block-level write commands to update memory blocks of a local mass storage device coupled to the second storage server, based on changes to the file system (of a first storage server). This limitation of claim 13 is recited from the perspective of the second storage server, but is similar to the limitation of sending the write commands to a remote mass storage device coupled to the second storage server, recited in claim 1. Thus, for similar reasons, claim 13 and all claims which depend on it are patentable over Dekoning and Strange. Claim 32 recites a similar limitation to that discussed above for claim 13. Thus, for similar reasons, claim 32 and all claims which depend on it are patentable over Dekoning and Strange.

Claim 34 recites:

34. A method, comprising:
in a first storage server, constructing a representation to reference each memory block used to store a file system, the memory blocks being part of a first set of mass storage devices comprising at least one mass storage device coupled locally to the first storage server; and
sending at least a portion of the representation to a second storage server, said portion comprising information to allow reconstruction of the entire representation by the second storage server so that the second storage server has a representation of memory blocks of a second set of mass storage devices comprising at least one mass storage device coupled locally to the second storage server used to store the file system.

For the foregoing reasons, the present application is believed to be in condition for allowance, and such action is earnestly requested.
(Emphasis added)


Applicants appreciate the Examiner's acknowledgement that Dekoning does not teach or suggest the above emphasized limitation. The Examiner, however, contends that Strange teaches or suggests the above emphasized limitation. Strange describes a method of synchronizing a mirror formed by a first storage device and a second storage device by copying data present in the second storage device but not in the first storage device to the first storage device (Strange's Abstract). The method disclosed in Strange compares two snapshots, a base snapshot and a resync snapshot, to figure out the difference between the two snapshots and uses the difference for synchronization purposes (*see* Strange's paragraphs 60-67). In addition, the Examiner acknowledges that changed portion of hierarchical nodes is used during resynchronization of mirroring plexes (office action mailed on 6/9/2006, page 3). Stranges, however, does not teach or suggest sending at least a portion of the representation to a second storage server, said portion comprising information to allow reconstruction of the entire representation by the second storage server so that the second storage server has a representation of memory blocks of a second set of mass storage devices comprising at least one mass storage device coupled locally to the second storage server used to store the file system, such as recited in claim 34. In fact, if the changed information is sent to the mirror for synchronization, there is no need to send a portion of the representation to reference each memory block used to store a file system to the second storage server for reconstruction of the entire representation by the second storage server. Thus, at least for the foregoing reasons, claim 34 is not anticipated or rendered obvious by Strange. Therefore, claim 34 and all claims which depend on it are patentable over Dekoning and Strange.

If any additional fee is required, please charge Deposit Account No. 02-2666.

Respectfully submitted,
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